

## ABSTRACT

A centrifugal separation device for use in a fluid separation system to centrifugally separate a composite fluid into the composite components thereof. This centrifugal separation device includes a centrifugal rotor housing and a rotor which is disposed in a freely rotatable disposition within the housing, the rotor having a fluid receiving area and several fluid flow channels defined therein. A composite fluid to be separated is delivered to the fluid receiving area from which it travels through a radial fluid transport channel to a circumferential fluid separation channel where it is subjected to substantial centrifugal forces which separate the composite fluid into components which each then travel to distinct first and second separated fluid outlet channels. The separated fluids then exit from these outlet channels and are then moved from the separation device to a collection bag for storage or may then be returned to the donor. The first and second fluid outlet channels also have respective first and second lengths which are related to each other so as to provide a substantial hydraulic pressure balance for the respective separated fluids flowing therethrough. Such a pressure balance controls the interface of the separated fluid components within the circumferential separation channel. The preferred relationship of the respective first and second lengths of said first and second separated fluid outlet channels to each other which provides the hydraulic balance is  $\rho_1 g h_1 = \rho_2 g h_2$  wherein the first length of the first outlet channel is  $h_1$ , and the second length of the second outlet channel is  $h_2$ , wherein  $g$  is a gravitational acceleration value and  $\rho_1$  represents the density of the fluids in the first outlet channel and  $\rho_2$  represents the density of the fluids in the second outlet channel. The preferred centrifugal drive motor used here produces a rotating magnetic field, which co-acts with a magnetically reactive material disposed in the rotor to rotate the rotor with the rotating magnetic field. A loopless, sealless continuous flow centrifuge is thus useful herein.